

Appendix B
Objectives of the Basinwide Salmon Recovery Strategy
and Federal Agency FCRPS Commitments and Interim Recovery Numbers

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A. Overview of Appendix B

Appendix B outlines the objectives of the Basin-wide Salmon Recovery Strategy (Recovery Strategy) and major federal agency commitments to support conservation of non-federal habitat and federal land management initiatives in Columbia River tributaries, mainstem, and estuary under the FCRPS biological opinion.

This appendix also includes interim abundance and productivity targets for ESA listed salmon and steelhead in the Interior Columbia Basin. These interim targets are only a starting point. NOAA Fisheries will replace these targets with scientifically more rigorous and comprehensive recovery goals using viability criteria developed through the Interior Columbia Technical Recovery Team (TRT) process that commenced in October, 2001.

B. Basinwide Salmon Recovery Strategy Objectives

- **Biological Objectives**
 - Maintain and improve upon the current distribution of fish and aquatic species, and halt declining population trends within 5-10 years.
 - Establish increasing trends in naturally-sustained fish populations in each subregion accessible to the fish and for each ESU within 25 years.
 - Restore distribution of fish and other aquatic species within their native range within 25 years (where feasible).
 - Conserve genetic diversity and allow natural patterns of genetic exchange to persist.
- **Ecological Objectives**
 - Prevent further degradation of tributary, mainstem and estuary habitat conditions and water quality.
 - Protect existing high quality habitats.
 - Restore habitats on a priority basis.
- **Water Quality Objective**
 - In the long term, attain state and tribal water quality standards in all critical habitats in the Columbia River and Snake River basins.

C. Federal Agency Commitments

The federal agencies include: U. S. Forest Service (Forest Service), Bureau of Land Management (BLM), Bonneville Power Administration (BPA), National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), Bureau of Indian Affairs (BIA), Army Corps of Engineers (COE), and Bureau of Reclamation (BOR)(and, if appropriate, the Natural Resource Conservation Service (NRCS), the Farm Service Administration (FSA) and U. S. Geological Survey (USGS)).

In the short term, federal land will be managed by current programs that protect important aquatic habitats. On the east side of the Cascades the Forest Service and BLM manage salmonid habitat according to PACFISH/INFISH, and on the west side of the Cascades the Forest Service and BLM manage salmonid habitat under the Northwest Forest Plan. PACFISH/INFISH and the Northwest Forest Plan aim to protect areas that contribute to salmonid recovery and improve riparian habitat and water quality throughout the Basin. To meet these objectives, the Northwest Forest Plan and PACFISH/INFISH:

- Establish watershed and riparian goals to maintain or restore all fish habitat
- Establish aquatic and riparian habitat management objectives
- Delineate riparian management areas
- Provide specific standards and guidelines for timber harvest, grazing, fire suppression and mining in riparian areas
- Provide a mechanism to delineate a system of key watersheds to protect and restore important fish habitats
- Use watershed analyses and subbasin reviews to set priorities and provide guidance on priorities for watershed restoration
- Provide general guidance on implementation and effectiveness monitoring
- Emphasize habitat restoration through such activities as closing and rehabilitating roads, replacing culverts, changing grazing and logging practices, and replanting native vegetation along streams and rivers.

In the longer term, management on the east side of the Cascades will be guided by the Interior Columbia Basin Ecosystem management Project (ICBEMP) as that strategy is put in place.

The Forest Service and BLM have made the following commitments to ensure that federal land management under ICBEMP will help protect and recover listed fish (these principles may be adjusted by the ICBEMP NEPA process and Record of Decision):

- Retain or recharter the Interagency Implementation Team (IIT) (senior staff from BLM, Forest Service, USFWS, and NMFS) or a similar interagency team to aid in the transition from interim aquatic management strategies and products developed by the IIT to the long term ICBEMP direction.
- Strategically focus Forest Service and BLM scarce restoration resources using broad scale aquatic/riparian restoration priorities to first secure federally-owned areas of high aquatic integrity and second, restore out from that core, rebuilding connected habitats that support spawning and rearing.
- Ensure that land managers consider the broad landscape context of site-specific decisions on management activities by requiring a hierarchically-linked approach to analysis at different geographic scales. This is important to ensuring that the type, location and sequencing of activities within a watershed are appropriate and done in the context of cumulative effects and broad scale issues, risks, opportunities and conditions.
- Cooperate with similar basin planning processes sponsored by the Northwest Power Planning Council, BPA and other federal agencies, states and tribes to identify habitat restoration opportunities and priorities. Integrate information from these processes into ICBEMP subbasin review when appropriate.
- Consult with NMFS and USFWS on land management plans and actions that may affect listed fish species following the Streamlined Consultation Procedures for Section 7 of the Endangered Species Act, July 1999.
- Collaborate early and frequently with states, tribes, local governments and advisory councils in land management analyses and decisions.
- Cooperate with the other federal agencies (in particular NMFS and USFWS), states and tribes in the development of recovery plans and conservation strategies for listed and proposed fish species. Require that land management plans and activities be consistent with approved recovery plans and conservation strategies.
- Collaborate with other federal agencies, states, tribes and local watershed groups in the development of watershed plans for both federal and non federal lands and cooperate in priority restoration projects by providing technical assistance, dissemination of information and allocation of staff, equipment and funds.
- Share information, technology and expertise, and pool resources, in order to make and implement better-informed decisions related to ecosystems and adaptive management across jurisdictional boundaries.
- Collaborate with other federal agencies, states and tribes to improve integrated application of agency budgets to maximize efficient use of funds towards high priority restoration efforts on both federal and non-federal lands.
- Collaborate with other federal agencies, states and tribes in monitoring efforts to assess if

habitat performance measures and standards are being met.

- Require that land management decisions be made as part of an ongoing process of planning, implementation, monitoring and evaluation. Incorporate new knowledge into management through adaptive management.
- Enhance the existing organizational structure with an interagency basinwide coordinating group and a number of sub-regional interagency coordinating committees. These coordinating groups and committees will ensure the implementation of ecosystem-based management across federal agencies' administrative boundaries, resolve implementation issues, be responsible for data management and monitoring, and incorporate new information through adaptive management.

Bureau of Reclamation (BOR)

Tributary

1. In priority watersheds, address all flow, passage and diversion problems over 10 years by restoring tributary flows, screening and combining water diversions, reduce passage obstructions.

Priority subbasins, organized by ESU are:

Upper Columbia Spring Chinook and Steelhead:

Methow
Entiat
Wenatchee

Snake River Fall and Spring/Summer Chinook and Steelhead:

Lemhi
Upper Salmon
Middle Fork Clearwater
Little Salmon

Mid-Columbia Chinook, and Steelhead:

North Fork John Day
Upper John Day
Middle Fork John Day

Lower Columbia Chinook, Steelhead and Chum:

Lewis
Upper Cowlitz
Willamette-Clackamas

Upper Willamette Chinook and Steelhead:

Clackamas
North Santiam

Corresponding 2000 FCRPS RPA Action- 149

2. Federal agencies will develop an initial set of performance measures based on four key habitat factors: instream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity and habitat access. Changes in these attributes can be measured at the reach or the watershed level and aggregated to larger spatial scales to evaluate progress at the subbasin or basin level.

Mainstem

1. Study the feasibility (including both biological benefits and ecological risks) of habitat modification to improve spawning conditions for chum salmon in the Ives Island area.

The objectives of the study will be to determine whether it would be beneficial to increase the frequency of access to spawning habitat or the areal extent of spawning habitat by means other than flow augmentation. The feasibility study will evaluate actions to alter the hydraulic control points that limit flow in the Ives Island area to provide the same areal extent and quality of sustainable spawning habitat (including characteristics such as upwelling through the gravels currently present at the site) at lower levels of Bonneville discharge; reconstruct spawning channels to increase the extent of habitat available at a given level of Bonneville discharge; and maintain hydraulic connections between tributary habitats and the mainstem Columbia River to allow entry for adults and emergence channels for juveniles.

Corresponding 2000 FCRPS RPA Action- 156

Bonneville Power Administration (BPA)

Tributary

1. Restore tributary flows through a water brokerage. Beginning in 2001, BPA is to fund a project to experiment with innovative ways to increase tributary flows by, for example, establishing a water brokerage to increase flows. The project will also develop a plan for a pollution bank through which water quality credits could be exchanged in markets. BPA also will fund the development of a methodology for ascertaining instream flows that meet ESA requirements.

Corresponding 2000 FCRPS RPA Action- 151

2. Support development of 303(d) lists and Clean Water Act TMDLs (total maximum daily load). BPA and other Action Agencies (if it is within their jurisdiction) are to support the development of state or tribal 303(d) lists. Additionally, they are to provide funding to implement measures with direct ESA benefit in approved TMDLs and consult with state and tribal water quality entities to determine how water quality efforts can complement each other and avoid duplication.

Corresponding 2000 FCRPS RPA Action- 152

3. Fund efforts to protect currently productive non-Federal habitat in Subbasins with listed salmon and steelhead. BPA is to place particular emphasis on protecting habitat that is at risk of being degraded, in accordance with criteria and priorities developed with NMFS.

Corresponding 2000 FCRPS RPA Action- 150

4. Protect up to 100 stream miles per year. BPA, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, will fund permanent or long-term protection for 100 miles of riparian buffers per year.

Corresponding 2000 FCRPS RPA Action- 153

5. Support Subbasin and Watershed Assessment and Planning. BPA and the other Federal agencies will work with the Northwest Power Planning Council to develop and update subbasin assessments and plans. Complete preliminary subbasin assessments by early 2001, preliminary subbasin plans by 2002.

Corresponding 2000 FCRPS RPA Action- 154

6. Federal agencies will develop an initial set of performance measures based on four key habitat factors: instream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity and habitat access. Changes in these attributes can be measured at the reach or the watershed level and aggregated to larger spatial scales to evaluate progress at the subbasin or basin level.

Mainstem

1. As lead agency: 1) develop a baseline data set; 2) develop and implement a habitat improvement plan that, insofar as possible, mimics the range and diversity of historic habitat conditions; and 3) develop and implement a rigorous monitoring and evaluation action plan that may lead to changes in the mainstem habitat program.

Corresponding 2000 FCRPS RPA Action- 155

2. Study the feasibility (including both biological benefits and ecological risks) of habitat modification to improve spawning conditions for chum salmon in the Ives Island area.

The objectives of the study will be to determine whether it would be beneficial to increase the frequency of access to spawning habitat or the areal extent of spawning habitat by means other than flow augmentation. The feasibility study will evaluate actions to alter the hydraulic control points that limit flow in the Ives Island area to provide the same areal extent and quality of sustainable spawning habitat (including characteristics such as upwelling through the gravels currently present at the site) at lower levels of Bonneville discharge; reconstruct spawning channels to increase the extent of habitat available at a given level of Bonneville discharge; and

maintain hydraulic connections between tributary habitats and the mainstem Columbia River to allow entry for adults and emergence channels for juveniles.

Corresponding 2000 FCRPS RPA Action- 156

3. BPA will fund actions to improve and restore tributary and mainstem habitat for CR chum salmon in the reach between The Dalles Dam and the mouth of the Columbia River.

The purpose of this action is to compensate for effects of FCRPS water management in the Ives Island area, which appreciably diminish the value of critical spawning habitat for the survival and recovery of CR chum salmon. The FCRPS has been a relatively important factor for decline of this ESU. Bonneville and The Dalles dams limit access to potential spawning habitat further upstream and Bonneville Reservoir drowned known historical habitat in Bonneville pool. Spawning is currently known in only two areas: the Grays River system in the Columbia River estuary and the Hardy/Hamilton creeks/Ives Island complex, downstream of Bonneville Dam.

Although most of the existing subbasin populations and the ESU as a whole are on a slightly positive growth trajectory (ESU-level $\lambda = 1.035$), RPA water management operations will continue to limit the areal extent of spawning habitat in Bonneville pool and the Ives Island complex in most water years. Therefore, BPA will 1) fund surveys of existing and potential tributary and mainstem habitat in the Columbia River between The Dalles Dam and the mouth of the Columbia River for suitable protection and restoration projects, 2) develop and implement an effective habitat improvement plan, 3) protect, via purchase, easement, or other means, existing or potential spawning habitat in this reach and adjacent tributaries (i.e., protect, restore, and/or create potentially productive spawning areas). The overall goal of this effort will be to ensure the survival and recovery of CR chum salmon by ensuring the availability of diverse, productive spawning habitats over a wide range of water years.

Corresponding 2000 FCRPS RPA Action- 157

Estuary

1. BPA and the COE will seek funding and develop an action plan to rapidly inventory estuarine habitat, model physical and biological features of the historical lower river and estuary, identify limiting biological and physical factors in the estuary, identify impacts of the FCRPS system on habitat and listed salmon in the estuary relative to other factors, and develop criteria for estuarine habitat restoration.

RPA 158

2. BPA and the COE, working with the Lower Columbia River Estuary Program (LCREP) and NMFS, shall develop a plan addressing the habitat needs of salmon and steelhead in the estuary.

Specific plans will be developed for salmon and steelhead habitat protection and enhancement. These plans should contain clear goals for listed salmon conservation in the estuary, identify habitats with the characteristics and diversity to support salmon productivity, identify potential

performance measures, identify flow requirements to support estuarine habitat requirements for salmon, and develop a program of research, monitoring, and evaluation. The plans should be completed by 2003.

Corresponding 2000 FCRPS RPA Action- 159

3. The COE and BPA, working with LCREP, shall develop and implement an estuary restoration program with a goal of protecting and enhancing 10,000 acres of tidal wetlands and other key habitats over 10 years, beginning in 2001, to rebuild productivity for listed populations in the lower 46 river miles of the Columbia River.

Much of the complexity of the estuary's historic shallow-water habitat and much of the estuary's saltwater wetlands have been lost due to the effects of local, navigational, and hydropower development. LCREP proposes a 10-year program to protect and enhance high-quality habitat on both sides of the river to support salmon rebuilding. A high priority should be put on tidal wetlands and other key habitats to rebuild productivity in the lower 46 river miles. Federal agencies will provide technical and financial support for this program and for efforts to implement on-the-ground activities identified in planning.

As more information is gained from inventory and analytical work, the 10,000-acre goal may be modified to ensure that habitats that are determined to be important to the survival and recovery of anadromous fish are addressed. Examples of acceptable estuary habitat improvement work include the following:

- Acquiring rights to diked lands
- Breaching levees
- Improving wetlands and aquatic plant communities
- Enhancing moist soil and wooded wetland via better management of river flows
- Reestablishing flow patterns that have been altered by causeways
- Supplementing the nutrient base by importing nutrient-rich sediments and large woody debris into the estuary
- Modifying abundance and distribution of predators by altering their habitat
- Creating wetland habitats in sand flats between the north and south channels
- Creating shallow channels in inter-tidal areas
- Enhancing connections between lakes, sloughs, side channels, and the main channel

Corresponding 2000 FCRPS RPA Action- 160

4. BPA and NMFS will develop a conceptual model of the relationship between estuarine conditions and salmon population structure and resilience. The model will highlight the relationship among hydropower, water management, estuarine conditions, and fish response. The work will enable the agencies to identify information gaps that have to be addressed to develop recommendations for FCRPS management and operations.

Corresponding 2000 FCRPS RPA Action- 162

5. The Federal agencies will develop performance measures for the actions taken in the estuary.

National Marine Fisheries Service (NMFS)

Tributary

1. Restore tributary flows through a water brokerage. NMFS is a co-lead agency with BPA in this commitment. NMFS and BPA will jointly decide whether to continue to fund this project beyond the \$5 million per year base in years 2-5. NMFS and BPA will also explore the possibility of integrating this project into the Northwest Power Planning Council's land and water trust fund.

Corresponding 2000 FCRPS RPA Action- 151

2. Protect currently productive habitat. Develop, with BPA, criteria and priorities for efforts to protect currently productive non-federal habitat.

3. Establish recovery objectives, de-listing criteria and recovery measures for the Upper Willamette, Lower Columbia, and Interior Columbia.

4. Federal agencies will develop an initial set of performance measures based on four key habitat factors: instream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity and habitat access. Changes in these attributes can be measured at the reach or the watershed level and aggregated to larger spatial scales to evaluate progress at the subbasin or basin level.

Estuary

1. NMFS, working with the BPA, the COE, and the Lower Columbia River Estuary Program (LCREP), shall develop a plan addressing the habitat needs of salmon and steelhead in the estuary.

Specific plans will be developed for salmon and steelhead habitat protection and enhancement. These plans should contain clear goals for listed salmon conservation in the estuary, identify habitats with the characteristics and diversity to support salmon productivity, identify potential performance measures, identify flow requirements to support estuarine habitat requirements for salmon, and develop a program of research, monitoring, and evaluation. The plans should be completed by 2003.

2. Support a Lower Columbia River Estuary Program (LCREP) designated entity to build a major information management and public education initiative through the LCREP to focus on endangered species, habitat loss and restoration, biological diversity and human activities that impact the river.
3. BPA and NMFS will develop a conceptual model of the relationship between estuarine conditions and salmon population structure and resilience. The model will highlight the relationship among hydropower, water management, estuarine conditions, and fish response. The work will enable the agencies to identify information gaps that have to be addressed to develop recommendations for FCRPS management and operations.
4. The Federal agencies will develop performance measures for the actions taken in the estuary.

Environmental Protection Agency (EPA)

Tributary

1. Integration of the Clean Water Act (CWA) TMDL (total maximum daily load) process and the Endangered Species Act (ESA). EPA, NMFS, U.S. Fish and Wildlife Service and BPA will select pilot projects on the basis of nominations from Oregon, Washington and Idaho. These pilot projects would have the following objectives:

- Integrate CWA TMDL processes and ESA to avoid duplication of effort
- Develop one set of watershed goals that meet CWA and ESA requirements
- Provide CWA and ESA assurances to the extent allowable by law

Three TMDLs and implementation plans/HCPs will be completed over three years.

2. Federal agencies will develop an initial set of performance measures based on four key habitat factors: instream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity and habitat access. Changes in these attributes can be measured at the reach or the watershed level and aggregated to larger spatial scales to evaluate progress at the subbasin or basin level.

Farm Service Agency (FSA)

Tributary

1. Protect up to 100 stream miles per year. BPA is to work with agricultural incentive programs such as the Conservation Reserve Enhancement Program, will fund long-term protection for 100 miles of riparian buffers per year.

U.S. Fish and Wildlife Service

Tributary

1. Integration of the Clean Water Act (CWA) TMDL (total maximum daily load) process and

the Endangered Species Act (ESA). EPA, NMFS, U.S. Fish and Wildlife Service and BPA will select pilot projects on the basis of nominations from Oregon, Washington and Idaho. These pilot projects would have the following objectives:

- Integrate CWA TMDL processes and ESA to avoid duplication of effort
- Develop one set of watershed goals that meet CWA and ESA requirements
- Provide CWA and ESA assurances to the extent allowable by law

Three TMDLs and implementation plans/HCPs will be completed over three years.

2. Federal agencies will develop an initial set of performance measures based on four key habitat factors: instream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity and habitat access. Changes in these attributes can be measured at the reach or the watershed level and aggregated to larger spatial scales to evaluate progress at the subbasin or basin level.

Estuary

1. The COE, with the U.S. Fish and Wildlife Service will significantly reduce Caspian tern and cormorant predation on salmonids. In the short term, it will preclude Caspian tern nesting on Rice Island. For the long term, it will disperse the tern population to its range of historic nesting in Pacific states.

2. Support a Lower Columbia River Estuary Program (LCREP) designated entity to build a major information management and public education initiative through the LCREP to focus on endangered species, habitat loss and restoration, biological diversity and human activities that impact the river.

3. The Federal agencies will develop performance measures for the actions taken in the estuary.

Army Corps of Engineers (COE)

Tributary

1. The Corps will use available funding and authorities to implement restoration actions in priority subbasins and in areas such as the Walla Walla basin, where water-diversion-related issues could cause take of listed species.

This requirement is not in the Basinwide Strategy but is found in RPA Action 149, 2000 FCRPS BiOp.

Mainstem

1. Study the feasibility (including both biological benefits and ecological risks) of habitat modification to improve spawning conditions for chum salmon in the Ives Island area.

The objectives of the study will be to determine whether it would be beneficial to increase the

frequency of access to spawning habitat or the areal extent of spawning habitat by means other than flow augmentation. The feasibility study will evaluate actions to alter the hydraulic control points that limit flow in the Ives Island area to provide the same areal extent and quality of sustainable spawning habitat (including characteristics such as upwelling through the gravels currently present at the site) at lower levels of Bonneville discharge; reconstruct spawning channels to increase the extent of habitat available at a given level of Bonneville discharge; and maintain hydraulic connections between tributary habitats and the mainstem Columbia River to allow entry for adults and emergence channels for juveniles.

Corresponding 2000 FCRPS RPA Action- 156

Estuary

1. BPA and the COE will seek funding and develop an action plan to rapidly inventory estuarine habitat, model physical and biological features of the historical lower river and estuary, identify limiting biological and physical factors in the estuary, identify impacts of the FCRPS system on habitat and listed salmon in the estuary relative to other factors, and develop criteria for estuarine habitat restoration.

Corresponding 2000 FCRPS RPA Action- 158

2. The COE (federal lead) and BPA, working with Lower Columbia River Estuary Program (LCREP) and NMFS, shall develop a plan addressing the habitat needs of salmon and steelhead in the estuary.

Specific plans will be developed for salmon and steelhead habitat protection and enhancement. These plans should contain clear goals for listed salmon conservation in the estuary, identify habitats with the characteristics and diversity to support salmon productivity, identify potential performance measures, identify flow requirements to support estuarine habitat requirements for salmon, and develop a program of research, monitoring, and evaluation. The plans should be completed by 2003.

Corresponding 2000 FCRPS RPA Action- 159

3. The COE and BPA, working with LCREP, shall develop and implement an estuary restoration program with a goal of protecting and enhancing 10,000 acres of tidal wetlands and other key habitats over 10 years, beginning in 2001, to rebuild productivity for listed populations in the lower 46 river miles of the Columbia River.

Much of the complexity of the estuary's historic shallow-water habitat and much of the estuary's saltwater wetlands have been lost due to the effects of local, navigational, and hydropower development. LCREP proposes a 10-year program to protect and enhance high-quality habitat on both sides of the river to support salmon rebuilding. A high priority should be put on tidal wetlands and other key habitats to rebuild productivity in the lower 46 river miles. Federal agencies will provide technical and financial support for this program and for efforts to implement on-the-ground activities identified in planning.

As more information is gained from inventory and analytical work, the 10,000-acre goal may be modified to ensure that habitats that are determined to be important to the survival and recovery of anadromous fish are addressed. Examples of acceptable estuary habitat improvement work include the following:

- Acquiring rights to diked lands
- Breaching levees
- Improving wetlands and aquatic plant communities
- Enhancing moist soil and wooded wetland via better management of river flows
- Reestablishing flow patterns that have been altered by causeways
- Supplementing the nutrient base by importing nutrient-rich sediments and large woody debris into the estuary
- Modifying abundance and distribution of predators by altering their habitat
- Creating wetland habitats in sand flats between the north and south channels
- Creating shallow channels in inter-tidal areas
- Enhancing connections between lakes, sloughs, side channels, and the main channel

Corresponding 2000 FCRPS RPA Action- 160

4. The COE, with the U.S. Fish and Wildlife Service will significantly reduce Caspian tern and cormorant predation on salmonids. In the short term, it will preclude Caspian tern nesting on Rice Island. For the long term, it will disperse the tern population to its range of historic nesting in Pacific states.

5. Support a Lower Columbia River Estuary Program (LCREP) designated entity to build a major information management and public education initiative through the LCREP to focus on endangered species, habitat loss and restoration, biological diversity and human activities that impact the river.

6. The Federal agencies will develop performance measures for the actions taken in the estuary.

D. Interim Abundance and Productivity Targets for Pacific Salmon and Steelhead Listed under the Endangered Species Act in the Interior Columbia Basin

These interim abundance and productivity targets are provided for geographic spawning aggregations of naturally produced spawning adults. They address the portion of each evolutionarily significant unit's (ESU's) historical range below the major mainstem dams that do not provide for fish passage (e.g., Chief Joseph Dam on the upper Columbia, Hells Canyon Dam on the Snake mainstem and Dworshak Dam on the north fork Clearwater River). The potential role of geographic spawning aggregations above these dams in the ESU's viability as a whole will be evaluated through the formal recovery planning process guided by recommendations from the Interior Columbia Technical Recovery Team (Interior TRT).

It is important to note that these interim targets are not in the context of the whole ESUs, rather they are defined for tentative geographic spawning aggregations within the ESUs. The Interior TRT will develop more accurate population definitions to replace these preliminarily defined spawning aggregations. The TRT will also generate alternative delisting scenarios – different combinations of viable salmonid populations that would each provide for the recovery of the ESU as a whole.

Existing Delisting Objectives – Snake River spring/summer chinook, Snake River sockeye, Upper Columbia spring chinook and Upper Columbia steelhead

Recommended recovery objectives have been developed for Snake River spring/summer chinook spawning aggregations, Snake River fall chinook and Snake River sockeye by the Snake River Recovery Team (Bevan et al., 1994). Those recommendations were modified to apply to index stock areas¹ based on recommendations from the IDFG v NMFS Biological Requirements Workgroup (BRWG, 1994) and were incorporated into the 1995 Proposed Snake River Recovery Plan (NMFS, 1995). The targets were further modified based on input from the Idaho Department of Fish and Game and were included in another draft recovery plan for Snake River Salmon (NMFS, 1997). Population definitions and recommended abundance and productivity objectives have also been developed for upper Columbia spring chinook and steelhead ESU spawning aggregations in the Methow, Entiat, and Wenatchee through the QAR (Quantitative Analytical Report) process (Ford et al., 2001). Ford et al. (2001) did not identify an abundance goal for the Okanogan due to a lack of sufficient historical information. However, the potential for naturally spawning aggregations in this area will be evaluated by the Interior TRT. Tables 1(a) and 1(b) summarize those specific recommendations for interim targets for listed chinook and sockeye stocks in the upper Columbia and Snake River basins. Productivity criteria for Snake River sockeye were developed in the 2000 FCRPS BiOp (NMFS, 2000) for a 40-48 year

¹The index area recovery objectives were developed for use in assessing the status of Snake River spring chinook stocks. Index areas have established time-series of scientific observations (e.g., redd counts), and are generally smaller in scale than geographic spawning aggregations. Objectives for these specific index areas have played a key role in the recent series of Federal Hydropower system Biological Opinions (e.g., NMFS, 2000; see section 1.3.1). Index area recovery objectives are included in Table 1(a).

time period, recognizing the time required to institute habitat rehabilitation options and the time lag of response in the sockeye populations. However, to be consistent with the targets provided for the other ESUs, the productivity targets given for Snake River sockeye in Table 1(b) represent only a general biological rule of thumb over a time period of 8 years.

New Delisting Objectives – Interior Columbia Steelhead and Middle Columbia Steelhead ESU

Population definitions, abundance and productivity targets for Snake River and Middle Columbia steelhead have not been formally developed. For these ESUs, geographic spawning aggregations and interim abundance targets are based upon the QAR approach used in the Upper Columbia Biological Requirements Report (Ford et al., 2001), and from: descriptions in the 1990 Subbasin Plans; recommendations from state level stock surveys (e.g., ODFW, 1995; WDFW, 1993; IDFG, 1985); NMFS' Proposed Recovery Plan for Snake River Salmon (NMFS, 1995); the 2000 Biological Opinion on the operation of the Federal Columbia River Power System (FCRPS BiOp) (NMFS, 2000); and Oregon Department of Fish and Wildlife reports regarding conservation assessments (Chilcote, 2001; ODFW, 1995). Table 2 lists possible interim abundance targets and interim productivity objectives for major steelhead spawning aggregations in the Upper Columbia, the Middle Columbia and the Snake River ESUs. The abundance values listed for the Wenatchee, Entiat and Methow subbasins are the levels recommended through the QAR process (Ford et al., 2001). Productivity criteria for Snake River and mid-Columbia steelhead were developed in the 2000 FCRPS BiOp (NMFS, 2000) for a 40-48 year time period, recognizing the time required to institute habitat rehabilitation options and the time lag of response in the steelhead populations. However, to be consistent with the targets provided for the other ESUs, the productivity targets given for Snake River and mid-Columbia steelhead in Table 2 represent only a general biological rule of thumb over a time period of 8 years.

Interim Targets – Description and Discussion of Caveats

Interim Abundance Targets

The enclosed Tables provide interim abundance targets generally representing the geometric mean of spawner escapement over time scales of eight years or approximately two generations. A challenge for co-managers, in the context of these interim abundance targets, is how to measure their progress toward recovery. Uncertainties associated with estimates of abundance and population trends must be considered when determining whether a population's recovery abundance goal has been met. These issues will need to be addressed in formal recovery planning.

Interim Productivity Objectives

In the long-term, a viable population will be characterized by a natural replacement rate (population growth rate) that fluctuates due to natural variability around an average of 1.0, but at an abundance high enough to provide a low risk of extinction. In many cases, spawner abundances are currently far below the levels required to minimize longer term risks of extinction. In those cases, average growth rates for spawner aggregations must exceed a 1:1 replacement rate until viable population abundance levels are achieved. These interim productivity and abundance targets should not be considered in isolation. A replacement rate ≥ 1 is indicative of a healthy population only if the abundance target has been achieved as well. However, a measure of the growth rate during the rebuilding/recovery phase may be most

informative to subbasin planning groups in the near term, as population growth parameters are more reliably quantified than are abundance parameters. The enclosed Tables include recommendations of productivity objectives utilizing the above rules of thumb, as well as recommendations from the FCRPS BiOp (NMFS, 2000), the QAR (Ford et al., 2001), and the Proposed Snake River Recovery Plan (NMFS, 1995).

Interim Spatial Structure and Diversity Objectives

The provided interim abundance and productivity targets are just a start, and do not provide a comprehensive index of healthy populations. Typically, a recovered ESU would have healthy populations representative of all the major life history types, and of all the major ecological and geographic areas within an ESU. In the absence of specific diversity data about populations, conservation of habitat diversity might be used as a reasonable interim proxy. More specifically, the QAR Biological Requirements Report (Ford et al., 2001) developed the following objective for upper Columbia River populations: "In order to be considered completely recovered, spring chinook (and steelhead) populations should be able to utilize properly functioning habitat in multiple spawning streams within each major tributary, with patterns of straying among these areas free from human caused disruptions." Furthermore, the FCRPS BiOp (NMFS 2000) states that "... currently defined populations should be maintained to ensure adequate genetic and life history diversity as well as the spatial distribution of populations within each ESU." NMFS recommends that these approaches be utilized in early Interior Columbia subbasin planning efforts.

Table 1(a). Interim Objectives – Listed Snake River and Upper Columbia Chinook ESUs²

Geographic Spawning Aggregations		Interim Abundance Targets ³		Interim Productivity Objectives
ESU/Spawning Aggregation	Index Areas	Spawning Aggregation	Index Areas	
<i>Upper Col. Spring Chinook ESU</i>				Upper Col. Spring chinook populations are currently well below recovery levels. The geometric mean ⁴ Natural Replacement Rate (NRR) will therefore need to be greater than 1.0 (QAR recommendations; Ford et al., 2001)
Methow	Methow	2000	2000	
Entiat	Entiat	500	500	
Okanogan		— — ⁵		
Wenatchee	Wenatchee	3750	3750	
<i>Snake River Spring/Summer Chinook ESU</i>				“For delisting to be considered, the eight year (approximately two generation) geometric mean cohort replacement rate of a listed species must exceed 1.0 during the eight years immediately prior to delisting. For spring/summer chinook salmon, this goal must be met for 80% of the index areas available for natural cohort replacement rate estimation.” (Proposed Snake River Recovery Plan; NMFS, 1995)
Tucannon River		1000		
Grande Ronde River		2000		
	Minam		439	
Imnaha		2500		
	Mainstem		802	
Lower Mainstem tributaries		1000		
Little Salmon River Basin		1800		
Mainstem Salmon small trib’s		700		
South Fork Salmon (Sum.)		9200		
	Johnson Cr.		288	

²These interim targets are derived from: Bevan et al., 1994; BRWG, 1995; NMFS, 1995; and NMFS, 1997.

³Eight year, or approx. 2 generations, geometric mean of annual natural spawners. Abundance targets are also provided for smaller scale “Index Areas”.

⁴Using the geometric mean as opposed to the arithmetic mean is a common practice when dealing with data series with inherently high annual variability. In the Columbia basin, the geometric mean has been used as a standard measure in the series of Biological Opinions issued covering the Federal Columbia River Power system (e.g., NMFS, 2000, section 1.3) and in the upper Columbia QAR.

⁵Ford et al. (2001) did not identify an abundance goal for the Okanogan due to a lack of sufficient historical information. However, the potential for naturally spawning aggregations in this area will be evaluated by the Interior TRT.

Table 1(a) *continued*. Interim Objectives – Listed Snake River and Upper Columbia Chinook ESUs

Geographic Spawning Aggregations		Interim Abundance Targets		Interim Productivity Objectives
<i>ESU/Spawning Aggregation</i>	Index Areas	Spawning Aggregation	Index Areas	
<i>Slope River Spring/Summer Chinook ESU (cont.)</i>				<i>(see above)</i>
Middle Fork Salmon River		9300		
	Bear Valley/Elk		911	
	Marsh Cr.		426	
Mainstem Tributaries (Middle Fk. to Lemhi)		700		
Lemhi River		2200		
Pahsimeroi (Sum.)		1300		
Mainstem Tributaries (Sum.) Lemhi to Redfish Lake Cr.		2000		
Mainstem Tributaries (Spr.) Lemhi to Yankee Fork		2400		
Upper East Fork Trib's (Spr.)		700		
Upper Salmon Basin (Spr.)		5100		

Table 1(b). Interim Objectives – Snake River Fall Chinook and Sockeye ESUs

<i>ESU</i>	Interim Abundance Targets^{6,7}	Interim Productivity Objectives
<i>Snake River Fall Chinook ESU</i>	2500	“For delisting to be considered, the eight year (approximately two generation) geometric mean cohort replacement rate of a listed species must exceed 1.0 during the eight years immediately prior to delisting. For spring/summer chinook salmon, this goal must be met for 80% of the index areas available for natural cohort replacement rate estimation.” (Proposed Snake River Recovery Plan; NMFS, 1995)
<i>Snake River Sockeye ESU</i>	1000 spawners in one lake; 500 spawners per year in a second lake.	The Snake River sockeye ESU is currently well below recovery levels. The geometric mean Natural Replacement Rate (NRR) will therefore need to be greater than 1.0. ⁸

⁶These interim targets are derived from the Snake River Recovery Team recommendations included in the 1995 Proposed Snake River Recovery Plan (NMFS, 1995).

⁷Eight year, or approx. 2 generations, geometric mean of annual natural spawners in the mainstem Snake River

⁸The 2000 FCRPS BiOp provided a productivity objective for Snake River sockeye, Snake River and Middle Columbia steelhead populations of “a median annual population growth rate (λ) greater than 1.0 over a 40-48 year period.” (NMFS, 2000).

Table 2(a). Interim Objectives – Snake River Steelhead ESU⁹

ESU/Spawning Aggregations	Interim Abundance Targets¹⁰	Interim Productivity Objectives
<i>Snow River Steelhead ESU</i>		Snake River ESU steelhead populations are currently well below recovery levels. The geometric mean Natural Replacement Rate (NRR) will therefore need to be greater than 1.0. ⁸
Tucannon R.	1300	
Asotin Cr.	400	
Grande Ronde		
Lower Gr. Ronde	2600	
Joseph Cr.	1400	
Middle Fork	2000	
Upper Mainstem	4000	
Imnaha	2700	
Clearwater River		
Mainstem	4900	
South Fork	3400	
Middle Fork	1700	
Selway R.	4900	
Lochsa R.	2800	
Salmon River		
Lower Salmon	1700	
Little Salmon	1400	
South Fork	4000	
Middle Fork	7400	
Upper Salmon	4700	
Lemhi	1600	
Pahsimeroi	800	

⁹These interim targets are derived from: Ford et al., 2001; Chilcote, 2001; NMFS, 1995; ODFW, 1995; WDFW, 1993; and IDFG, 1985.

¹⁰Eight year, or approx. 2 generations, geometric mean of annual natural spawners.

Table 2(b). Interim Objectives – Upper & Middle Columbia River Steelhead ESUs¹¹

ESU/ Spawning Aggregations	Interim Abundance Targets ¹²	Interim Productivity Objectives
Upper Columbia Steelhead ESU		
Methow R.	2500	Geometric mean Natural Return Rate (NRR) should be 1.0 or greater over a sufficient number of years to achieve a desired level of statistical power. (QAR recommendations; Ford et al., 2001)
Entiat R.	500	
Okanogan R.	-- ¹³	
Wenatchee R	2500	
Middle Columbia Steelhead ESU		
Yakima River		Middle Columbia ESU steelhead populations are currently well below recovery levels. The geometric mean Natural Replacement Rate (NRR) will therefore need to be greater than 1.0. ⁸
Satus/Toppenish	2400	
Naches	3400	
Mainstem (Wapato to Roza)	1800	
Mainstem (above Roza)	2900 ¹⁴	
Klickitat	3600	
Walla-Walla	2600	
Umatilla	2300	
Deschutes (Below Pelton Dam complex)	6300	
John Day		
North Fork	2700	
Middle Fork	1300	
South Fork	600	
Lower John Day	3200	
Upper John Day	2000	

¹¹These interim targets are derived from: Ford et al., 2001; and NMFS, 2000.

¹²Eight year, or approx. 2 generations, geometric mean of annual natural spawners

¹³Ford et al. (2001) did not identify an abundance goal for the Okanogan due to a lack of sufficient historical information. However, the potential for naturally spawning aggregations in this area will be evaluated by the Interior TRT.

¹⁴NWPPC smolt capacity reduced by 50% to reflect shared production potential with resident form.

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